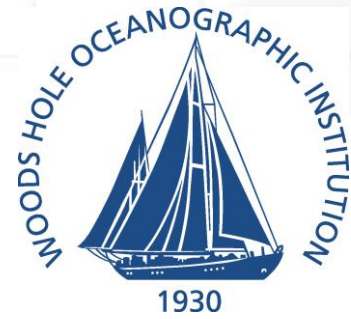




Facilitating Next Generation Science Collaboration: Respecting and Mediating Vocabularies with Semantics in Ecosystems Assessments.

January 26, 2012 Data 2012

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NSF INTEROP ECO-OP project. <http://tw.rpi.edu/web/project/ECOOP>





Marine ecosystems





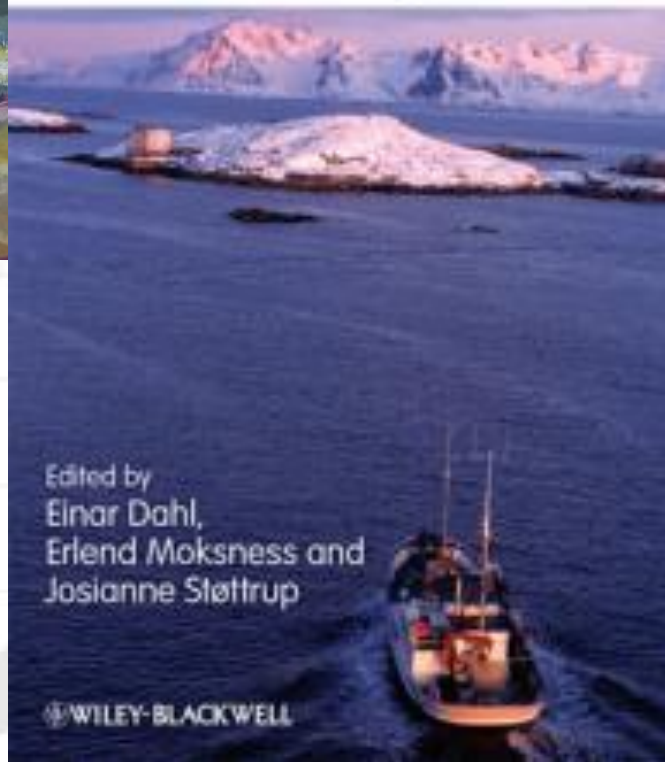
Fish, science, decision



Integrated Coastal Zone Management

Edited by
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Erlend Moksness and
Josianne Støttrup

WILEY-BLACKWELL



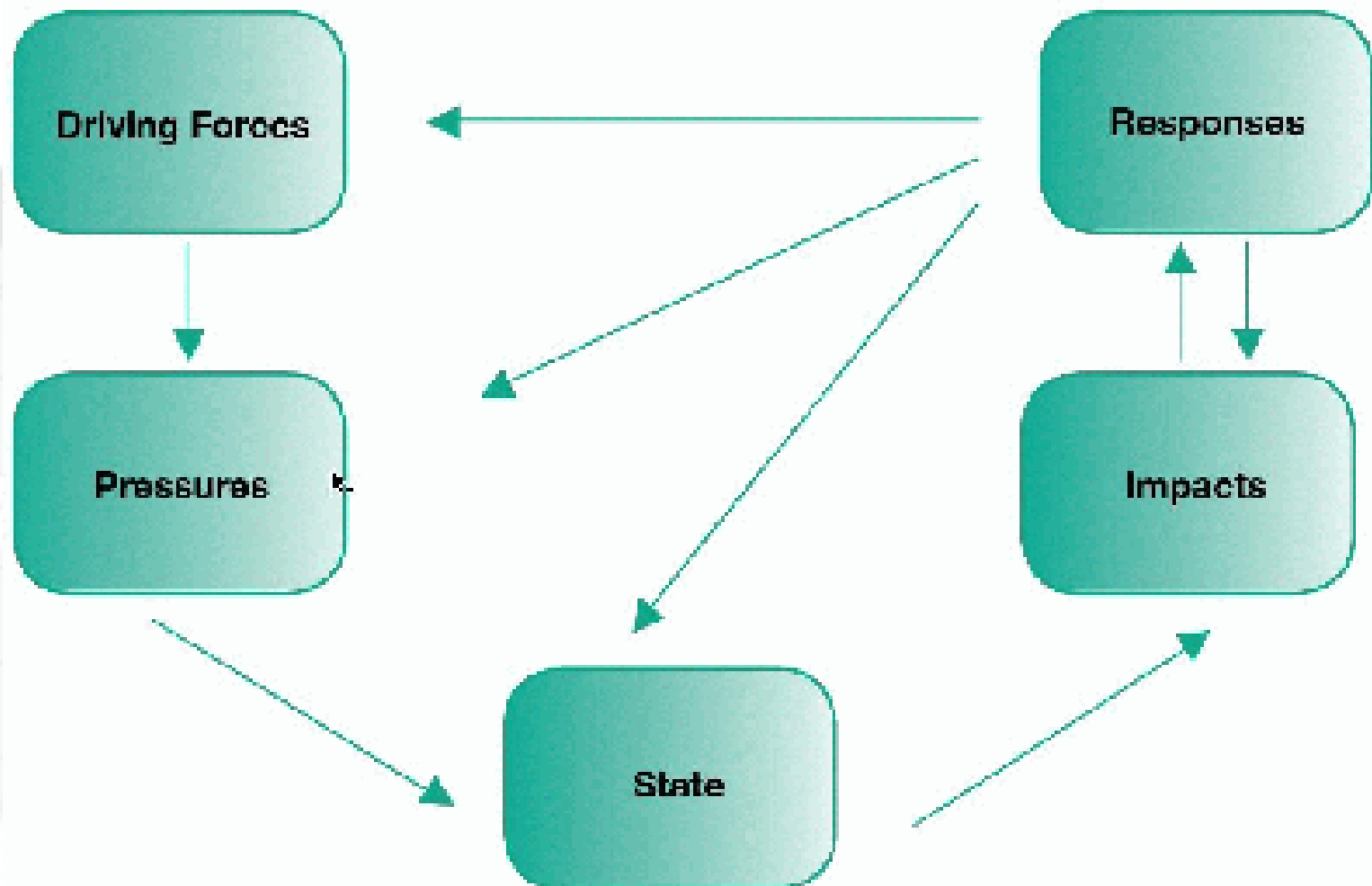


Vision?

- “Our vision is to develop, facilitate, and maintain sustained multi-way engagement of natural and social scientists and many practitioners in multi-scale local to global networks for LMEs”.
 - Organization is required so participants can carry out their (respective) mission(s)
 - Those participants (by defn.) will never be in a single organization -> virtual organization
- Goal: We want to perform routine assessments of LMEs involving all (or as many) stakeholders and we want robust science data presented in forms that various end-users can consume...



Framework - DPSIR





Semantics of DPSIR?

- ▶ ● Driving force of energy development
- ▶ ● Pressure of energy development
- ▶ ● State change of energy development
- ▶ ● Impact of energy development
- Response for sustainable energy development
- Society
- Environment
- Economy
- Energy system
- Energy supply sector
- Energy service
- ▶ ● Energy technology
- ▶ ● Energy resource
- ▶ ● Energy supply process

- Pressure of energy development
- ▶ ● GHG emission from energy production and use
- Contaminant discharges in liquid effluents
- ▶ ● Air pollutants emission from energy systems
- Generation of radioactive wastes
- Accident as a result of energy uses
- Generation of wastes
- Land area taken up by energy facilities
- Radionuclides in atmospheric radioactive discharges
- Oil discharges into coastal waters
- Forests' income to energy prices
- ▶ ● Energy resources depletion



Drivers/ Pressures

- ***Physical Drivers***

- North Atlantic Oscillation
- Atlantic Multi-decadal Oscillation

- ***Human Drivers***

- Population
- Income

- ***Human Pressures (Fishery Removals)***

- Number Groundfish Vessels
- Landings, Principal Groundfish
- Landings, Other Fish
- Landings, Small Pelagics
- Landings, Crustaceans
- Landings, Molluscs

- ***Temperature***

- Extended Reconstructed SST
- Coastal Temperature, Virginia
- Coastal Temperature, Woods Hole
- Coastal Temperature, Boothbay Harbor
- Survey sea surface temperature
- Survey bottom sea temperature
- Thermal Habitat <4°C
- Thermal Habitat >5°C and <15 °C
- Thermal Habitat >16°C

- ***River Discharge***

- River Flow-Gulf of Maine
- River Flow-Middle Atlantic Bight
- River Flow-Southern New England

- ***Wind Fields***

- Wind Stress, Cape Hatteras
- Wind Stress, New York
- Wind Stress, Georges Bank
- Wind Stress East-West, Cape Hatteras
- Wind Stress East-West, New York
- Wind Stress East-West, Georges Bank
- Wind Stress North-South, Cape Hatteras
- Wind Stress North-South, New York
- Wind Stress North-South, Georges Bank

- ***Other***

- Stratification
- Survey surface salinity
- Survey bottom salinity
- Gulf Stream Location
- %Labrador-Subarctic Slope Water in GoM



Ecosystem State Variables

Plankton

- Continuous Plankton Recorder Color Index.
- Zooplankton Ecosystem Biovolume
- Ratio of Small to Large Zooplankton

Nekton/Benthos

- Relative Abundance, Crustaceans
- Relative Abundance, Elasmobranch
- Relative Abundance, Ground Fish
- Relative Abundance, Molluscs
- Relative Abundance, Other Fish
- Relative Abundance, Small Pelagics
- Relative Abundance, All Species

Demography/Trophic Level

- Mean Trophic Level Catch
- Mean Trophic Level Survey
- Primary Production Required, Landings
- Mean Length

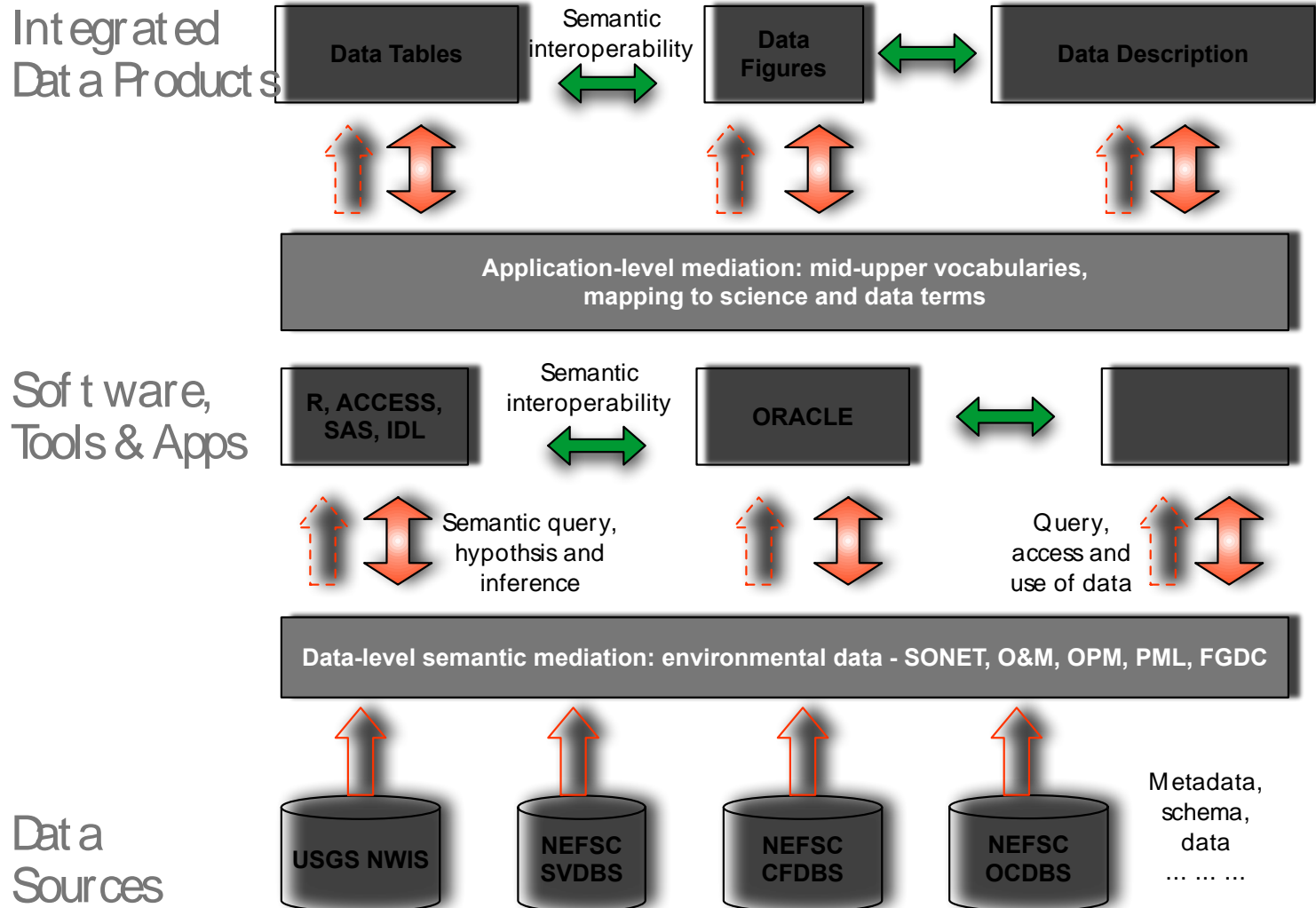
Community Composition

- Thermal Preference
- Pelagic to Demersal Ratio
- Elasmobranch to Demersal Groundfish Ratio
- Impacts
- Groundfish Fishery Revenue



Northeast Status Report

Ecosystem Status Report



Ecosystem Status Report

For the Northeast U.S. Continental Shelf Large Marine Ecosystem



Ecosystem Assessment Program, Northeast Fisheries Science Center

July 2009

Main Findings

The Northeast U.S. Continental Shelf Large Marine Ecosystem (NES LME) has undergone sustained perturbations due to environmental and anthropogenic impacts over the last four decades, resulting in fundamental changes in system structure.

Thermal conditions in the NES LME are changing due to warming of coastal and shelf waters and cooling in the northern end of the range. As a consequence, there has been a constriction of thermal habitats in the ecosystem, a northward shift in the distributions of some fish species and a shift to a warmer-water fish community.

Zooplankton community structure has also changed in concert with climate and physical processes acting over the North Atlantic Basin indicating the importance of remote forcing to the function and structure of this ecosystem

Important changes in some components of benthic communities, notably increased abundance of sea scallops and lobster are evident, reflecting changes in fishery management and/or ecological conditions.

The direct and indirect effects of species-selective harvesting patterns have also contributed to shifts fish community composition which is now dominated by small pelagic fishes and elasmobranch species (skates and small sharks) of low relative economic value.

The trajectory of regional human population size suggests that anthropogenic pressure in the ecosystem will continue to increase.

The Northeast U.S. Continental Shelf is classified as experiencing ecosystem overfishing according to published criteria for this designation, although improvement in the condition of several resource species has occurred and exploitation effects have been reduced for some system components over the last decade.



If needed





Informatics enables a new approach

- Use cases
- Stakeholders
- Distributed authority
- Access control
- Ontologies
- Maintaining Identity

Semantic Web Methodology & Technology Development Process

- ▶ Establish and improve a well-defined methodology vision for semantic technology based on application development
- ▶ Leverage controlled vocabularies, etc.

